

WHAT IS CLAIMED IS:

1) A device for singling out items coming from a feeder, said feeder comprising an outlet channel for conveying said items towards a relevant end section, said device including:

compacting means placed along said outlet channel for gathering said items one behind the other according to a continuous row at said end section;

abutment and catching means of single items for abutting and catching a series of single and successive leading items of said row of items at said end section;

extracting and conveying means for driving said abutment and catching means to pass according to a direction of extraction at said end section for abutting and catching a series of single and successive leading items and for transferring and placing said series of singled out items at a handling station.

2. A device according to claim 1, wherein:

said extracting and conveying means include a reciprocating driving belt situated close to said outlet channel and arranged to face said end section of the outlet channel;

said abutment and catching means include a plate carried by said driving belt, and a shaped comb connected to said plate, in a relevant longitudinal side facing said end section;

a series of recesses made in said comb and spaced from one another, said recesses having a shape such as to receive in abutment and hold, with respect to the aforementioned direction of extraction, a respective single item: and

a series of catching ramps, also made in said comb and converging towards a relative recess of the aforementioned series of recesses, said catching ramps, following a passage of the comb according to said direction of extraction at the end section of the channel, being adapted for individually and

successively catching respective leading items conveyed by said outlet channel towards said end section and released by the stop means, and for accompanying each of said singled out items into relevant recesses.

3. A device according to claim 1, wherein said comb is alternately moved by the driving belt from a first retracted end position, wherein it is located upstream of the end section of the outlet channel with a relevant first catching ramp of said series of ramps facing said end section, to a second advanced end position according to the direction of extraction, at which the robot operated handling station mentioned above is placed, the shift of said comb from said first retracted end position to said second advanced end position, in accordance to said extraction direction, determining, due to said ramps and recesses, the extraction and catching of a series of single and successive items from said outlet channel, as well as transferring and placing said items to said robot operated handling station.

4. A device according to claim 1, wherein said outlet channel is inclined so as to make conveyance of said items towards said end section easier due to gravity.

5. A device according to claim 1, wherein said compacting means include a plurality of nozzles for directing, from upstream to downstream towards the end section, compressed air jets on the items as they are conveyed towards said end section, so as to gather said items.

6. A device according to claim 1, further including stop means, situated at said end section for striking the leading item of the row of items, so as to temporarily hold said items into said outlet channel, said stop means being capable of releasing said items in phase relation with passage of said abutment and catching means through said end section.

7. A device according to claim 2, wherein said comb has a

series of recesses, spaced from one another according to a fixed step and designed to receive in abutment and hold respective and subsequent leading items singling them out and placing them at regular distances from one another.

8. A device according to claim 2, wherein said driving belt is an endless belt and is oriented horizontally and has an upper operative branch supporting said plate.

9. A device according to claim 2, wherein said driving belt is arranged beside a conveying line for conveying containers with which said singled out items are to be associated, said conveying line being designed to transfer said containers (to said handling station.

10. A device according to claim 9, wherein at said handling station, said series of items, singled out and spaced out by said comb, is set to face and correspond to a series of containers conveyed by said conveying line to said handling station.

11. A device according to claim 3, further including stabilising means associated to said comb and capable of keeping said singled out items firmly oriented and housed within said recesses during transferring from said first retracted end position to the second advanced end position, at said handling station.

12. A device according to claim 9, wherein a robot operated unit is situated at said handling station for picking up said series of singled out items from said recesses of said comb and for transferring said series of singled out items to said conveying line, thus applying said singled out items to said series of containers.

13. A device according to claim 12, wherein said robot operated unit includes an operating head for supporting and moving a plurality of pick up means provided in a number at least corresponding to said series of items transferred by

said comb to said handling station for applying to said series of containers.

14. A device according to claim 2, wherein said items are stoppers for dispensing metered quantities of products contained into said container to which said stoppers are to be applied, and include a tube which is to be introduced and situated into said containers, said device further including stabilising means associated to said comb and capable of stabilizing and keeping a series of said singled out items, caught by said ramps and held by said recesses, oriented with the related tubes substantially vertical during transferring of said comb, according to said extraction direction, from said first retracted end position to the second advanced end position, at said handling station.

15. A device according to claim 14, wherein said stabilizing means include a series of clamps, each clamp of said series of clamps being operatively associated to said comb, below a corresponding recess of said series of recesses, each clamp of said series of clamps being adapted to close for gripping a tube of a related stopper caught by a corresponding recess, in phase relation with the passage, according to said direction of extraction, of the relevant recess at the end section of said outlet channel to abut and catch a relevant leading item, so as to stabilise the same caught item during the aforementioned passage.

16. A device according to claim 14, wherein said stabilizing means include a counter-guide arranged counter-facing the same comb at its path from the first retracted end position to the second advanced end position, said counter-guide being adapted for holding the singled out items gripped between it and the recesses of the comb, with a firm orientation, during said transferring to said handling station.

17. A device according to claim 16, wherein said counter-guide has a L-shaped cross-section adapted for receiving in abutment

an outer portion of said items caught by said comb.

18. A device according to claim 14, wherein a container conveying line conveys a series of containers, to which the stoppers of said series of stoppers spaced out and caught by said comb, at said handling station, are to be applied, and a robot operated unit is located at said handling station for picking up said series of stoppers, for raising said series of stoppers so as to release the related tubes from said stabilizing means, for transferring said series of stoppers up to a position above said series of containers, lowering said series of stoppers to introduce completely said tubes into said containers and to complete application of said stoppers to said containers.

19. A device according to claim 18, wherein said robot operated unit is provided with an operating head for supporting and moving a plurality of pick up means present in a number at least corresponding to the series of said items singled out and transferred by said comb at the handling station for application to the above mentioned series of containers, and with a series of clamp means vertically moving on top of the series of containers, arranged along said conveying line, said clamp means being provided for encircling the tubes of said stoppers at their upper portion, in phase relation with a transferring of said stoppers to a position above said containers carried out by pick up means, and for sliding downwards along said tubes toward a bottom portion of said tubes, for straightening the tubes just before said pick up means are lowered, and for guiding the tubes, when said pick up means are lowered, to facilitate introduction of the tubes into said containers, said clamp means being designed for lastly opening so as to release said tubes and allow said pick up means to complete application of the stoppers to said containers.